The potential of carbon crediting to support restoration of degraded grasslands

3 Rivers Sustainable Grazing Project

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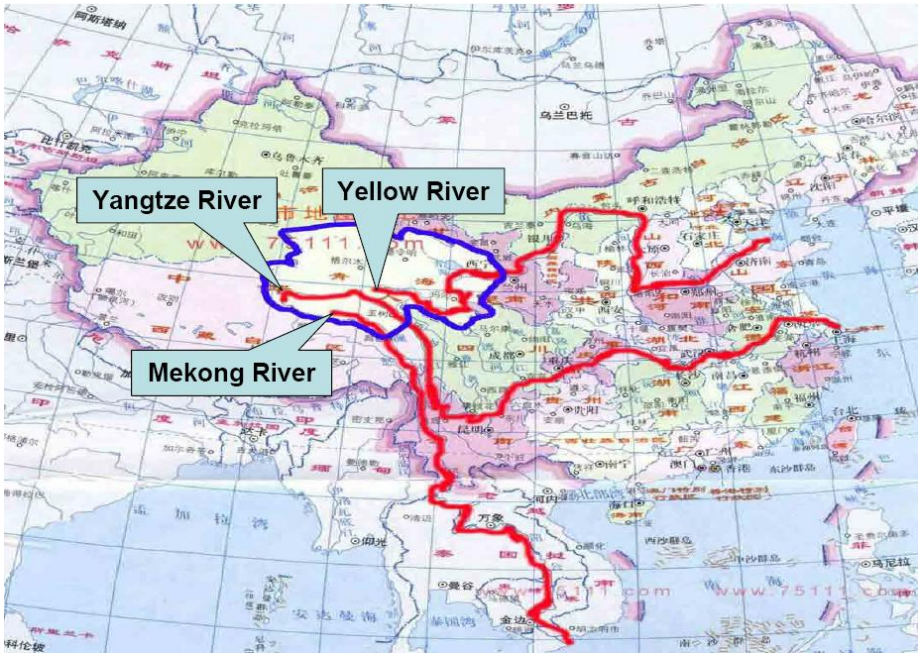
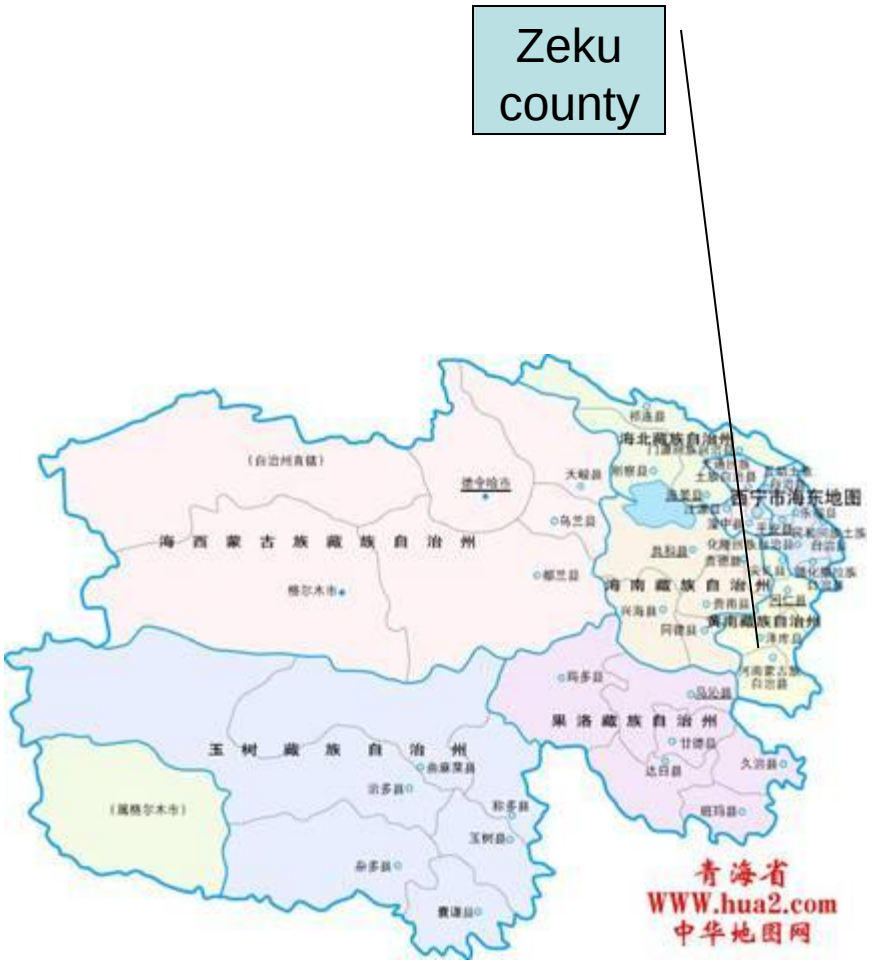
Outline

- Project overview
- Economic analysis
- VCS Methodology
- Conclusions / arising questions

Location of project site: China, 3 Rivers Source Area, Qinghai-Tibet Plateau



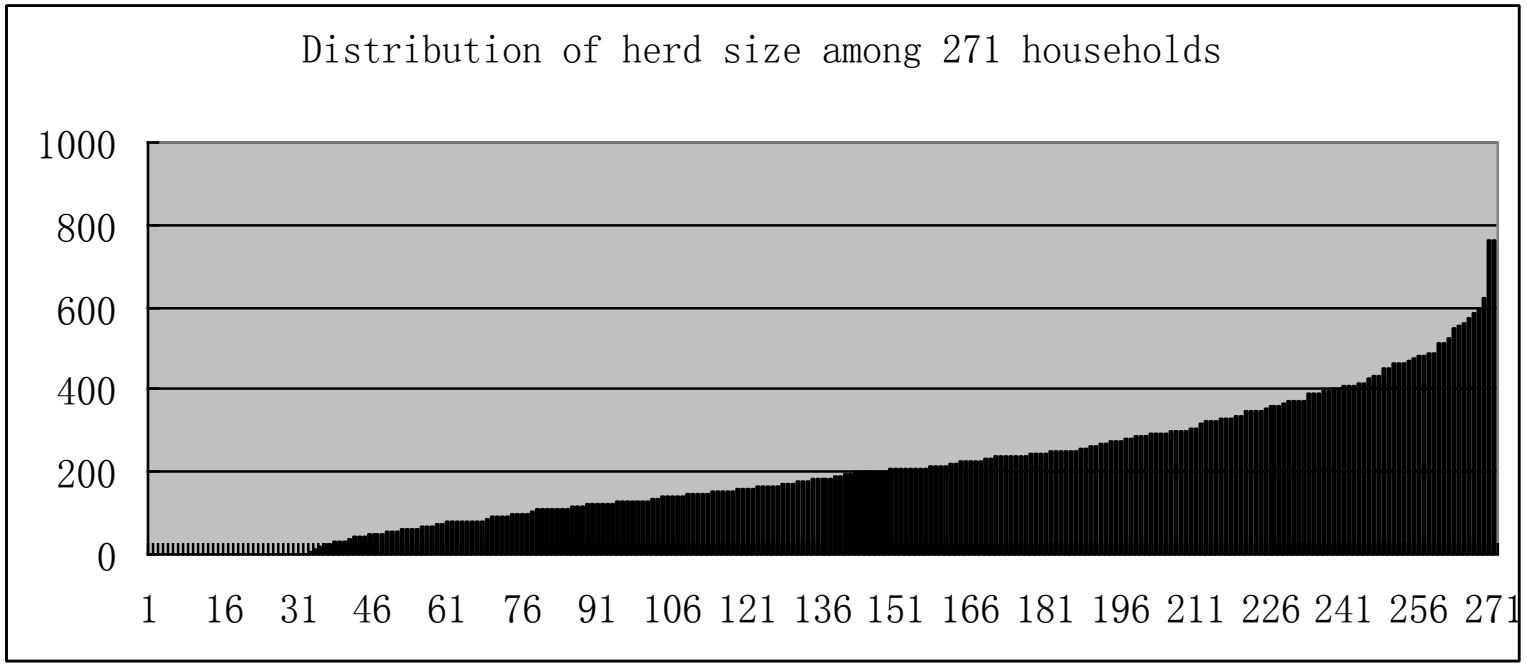


Favorable context

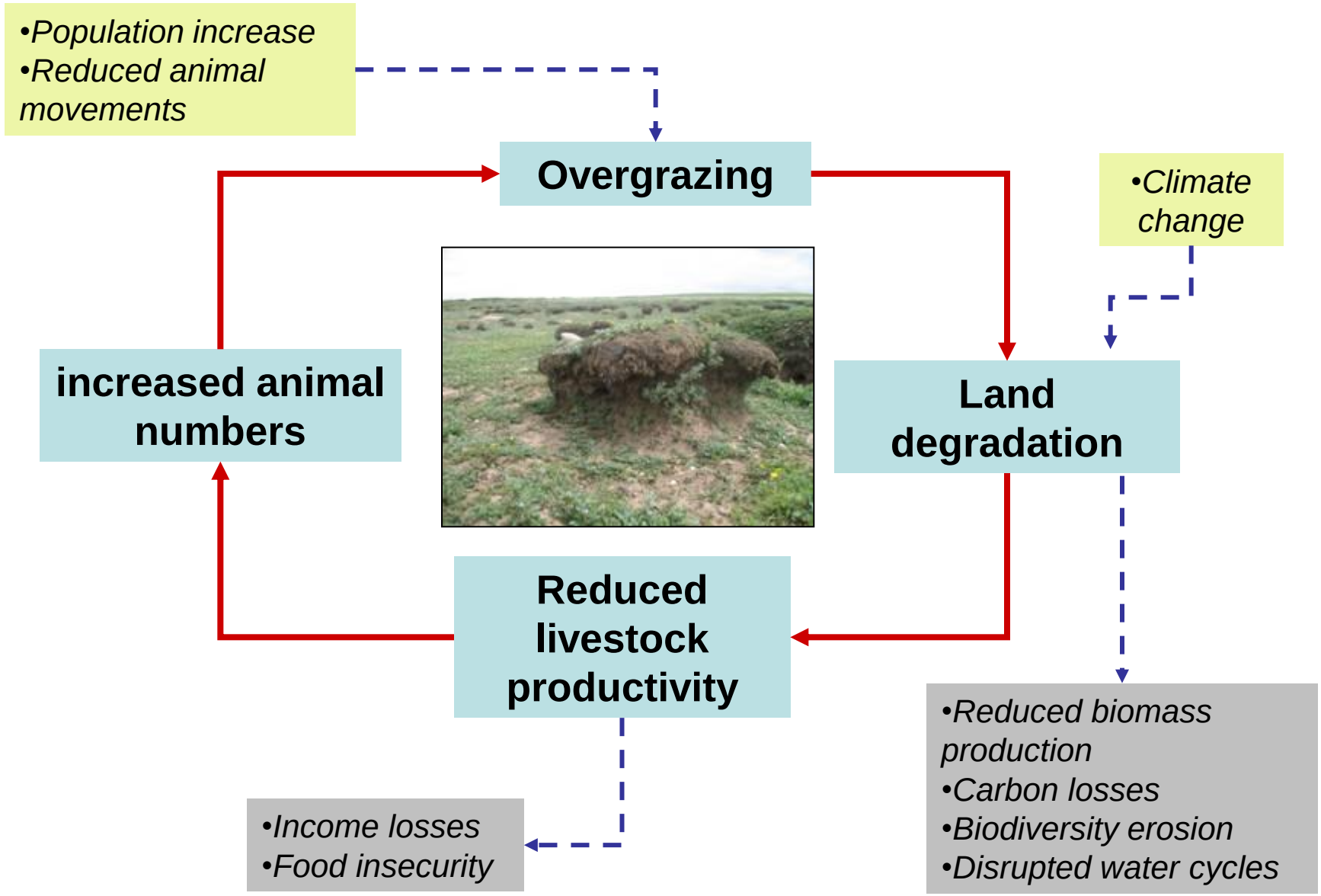
- institutions (land tenure, administration, herders organizations)
- science and knowledge (baseline information, technical packages, strength of national institutes)

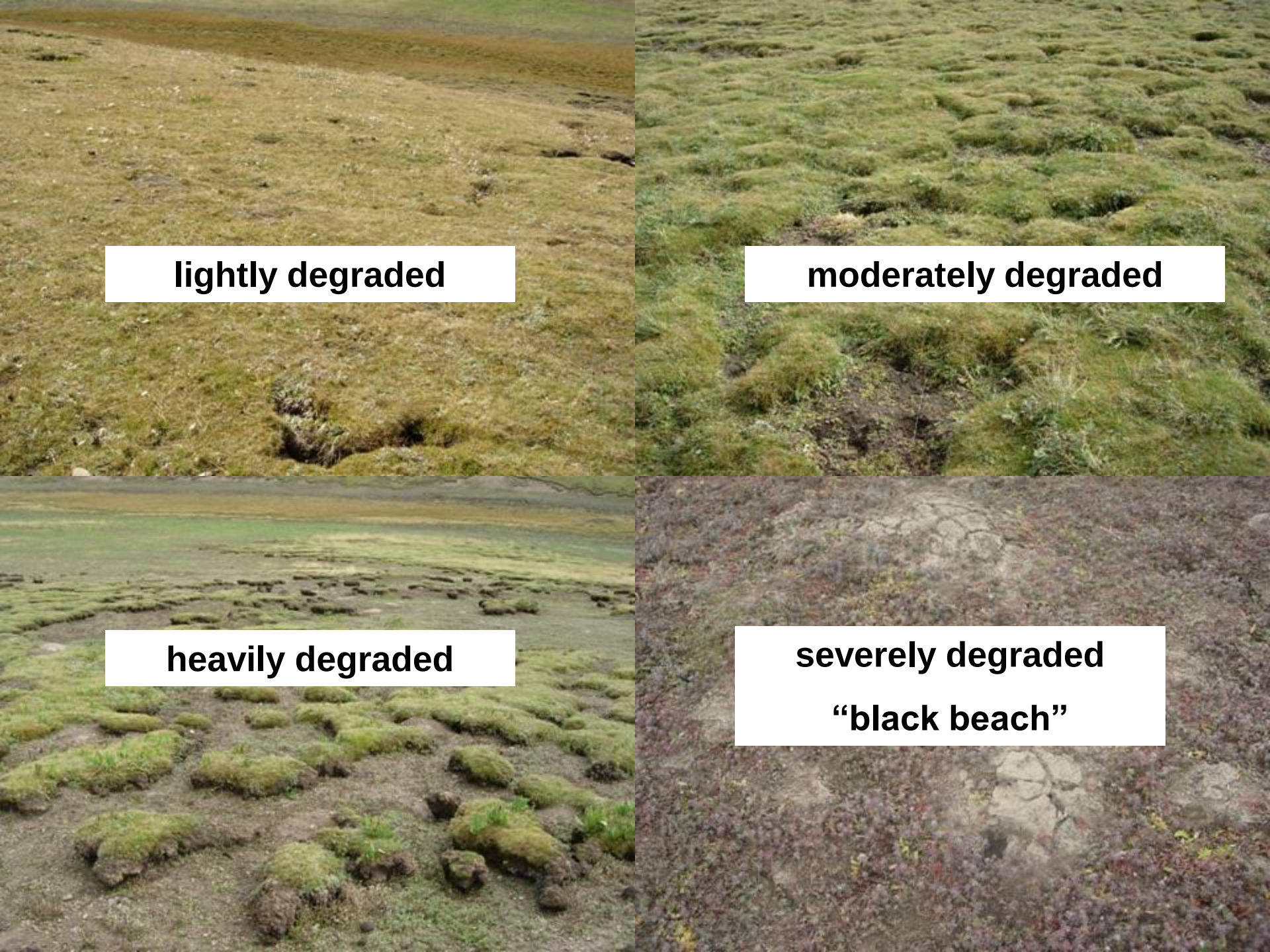
• Project participants

- 271 households
- 22,615 ha
- 14,354 sheep
- 9,216 yaks



The issue


•Population increase
•Reduced animal movements
Overgrazing
•Climate change
increased animal numbers
Land degradation
Reduced livestock productivity
•Reduced biomass production
•Carbon losses
•Biodiversity erosion
•Disrupted water cycles
•Income losses
•Food insecurity


lightly degraded
moderately degraded
heavily degraded
severely degraded
“black beach”

Project rationale

Goal - Improve the delivery of food and ecosystem services in the project area.

Specific objectives

- Improve producers' livelihood and resilience to climate change through sustainable SGM and better livestock marketing
- deliver carbon credits to the voluntary market
- improve water and biodiversity resources through the restoration of degraded grassland

Approach

Through the payment for carbon credits, finance an equilibrium shift: from a "degraded equilibrium" with low food and environmental services to a "restored equilibrium" with increased agricultural productivity and environmental services

Project Activities (1)

Tailored measures to restore **grasslands** (household by household basis):

- Moderately & lightly degraded areas
  - Delay grazing of summer grasslands
  - Adopt more sustainable stocking rates
- Severely & heavily degraded areas
  - Reseeding & cultivating grass

➢ *Average de-stocking rate in years 1-10 : 33%*

➢ *Stocking rates return to baseline levels yrs 11-20*

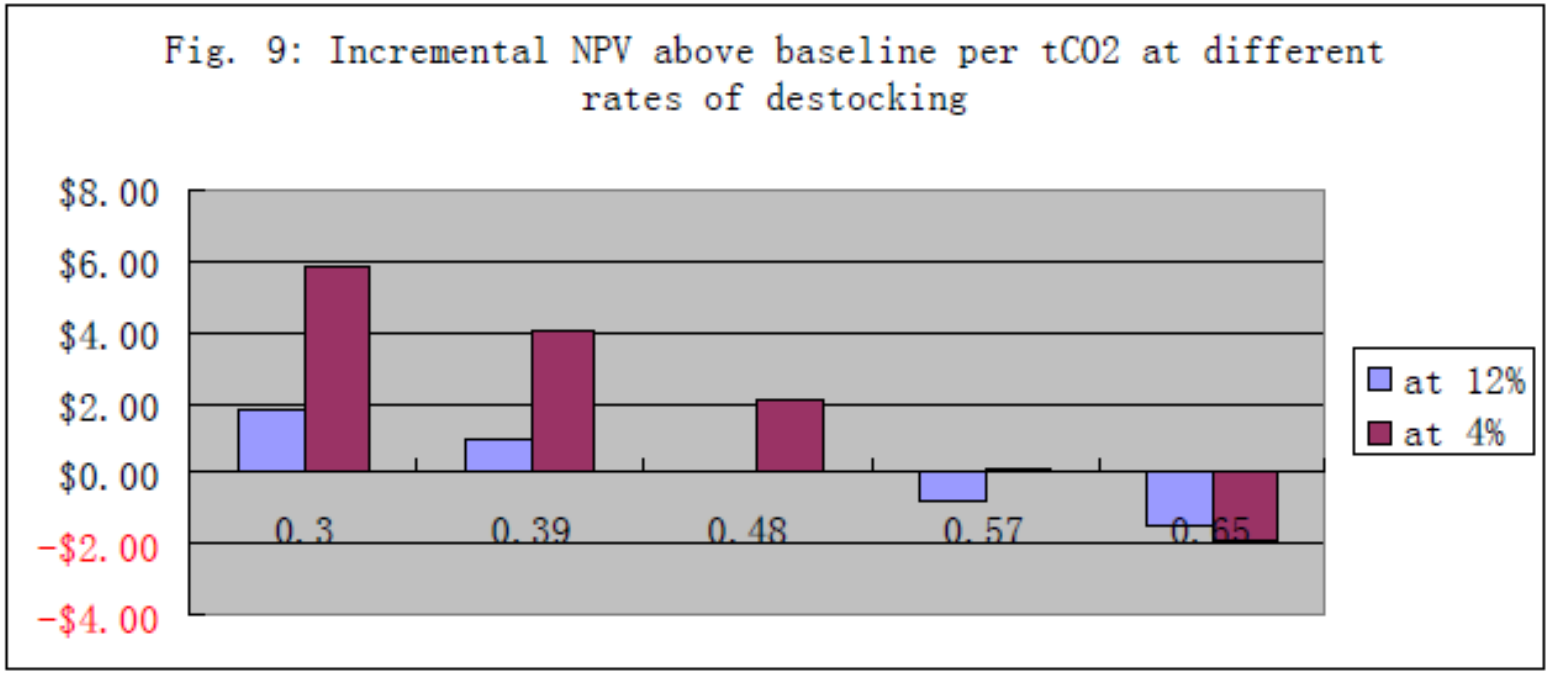
- Improve **animal husbandry**
  - Winter housing
  - Winter feeding supplementation
- Livestock **product marketing**

Carbon sequestration

- Total estimated **carbon sequestered** (based on locally calibrated Century model):
  - 1.33 million tCO_2e
  - 66,700 tCO_2e/yr

- Project average C sequestration potential = **3 tCO_2e/yr**
- IPCC global average C sequestration potential:
  - **0.81 tCO_2e/yr** (moist climate)
  - **0.11 tCO_2e/yr** (dry climate)

Marginal abatement cost (MAC) assessment



- Assessment of per tCO_2 sequestration costs at varying levels of destocking, based on a **representative average size farm**
- Moderate rates of destocking enable C sequestration without incurring costs

Barriers to C sequestration

Q: If NPV is +ve, then why would herders need incentives to adopt SGM protocols?

A: Barriers

- Financing
- Transaction costs (including C accounting methodology)
- Capacity
- Knowledge
- Aversion to change & perceived risk

Financial barriers to C sequestration (1)

Timing of major investments & revenue flows

- Significant investments in grass cultivation & maintenance years 1,5,10,15

- Reduced annual revenue with lower stocking rates, as grasslands are restoring

Financial barriers to C sequestration (2)

- Can herders finance implementation themselves?

- Focusing on investment requirements in years 1-10:
  - we find that herder income from initial destocking sales of livestock **can only cover part of initial grass cultivation & maintenance costs**
  - **credit** could be used to cover gap, but only **at subsidized rates**

- Thus, financing constraints cannot be overcome with commercially available financial products

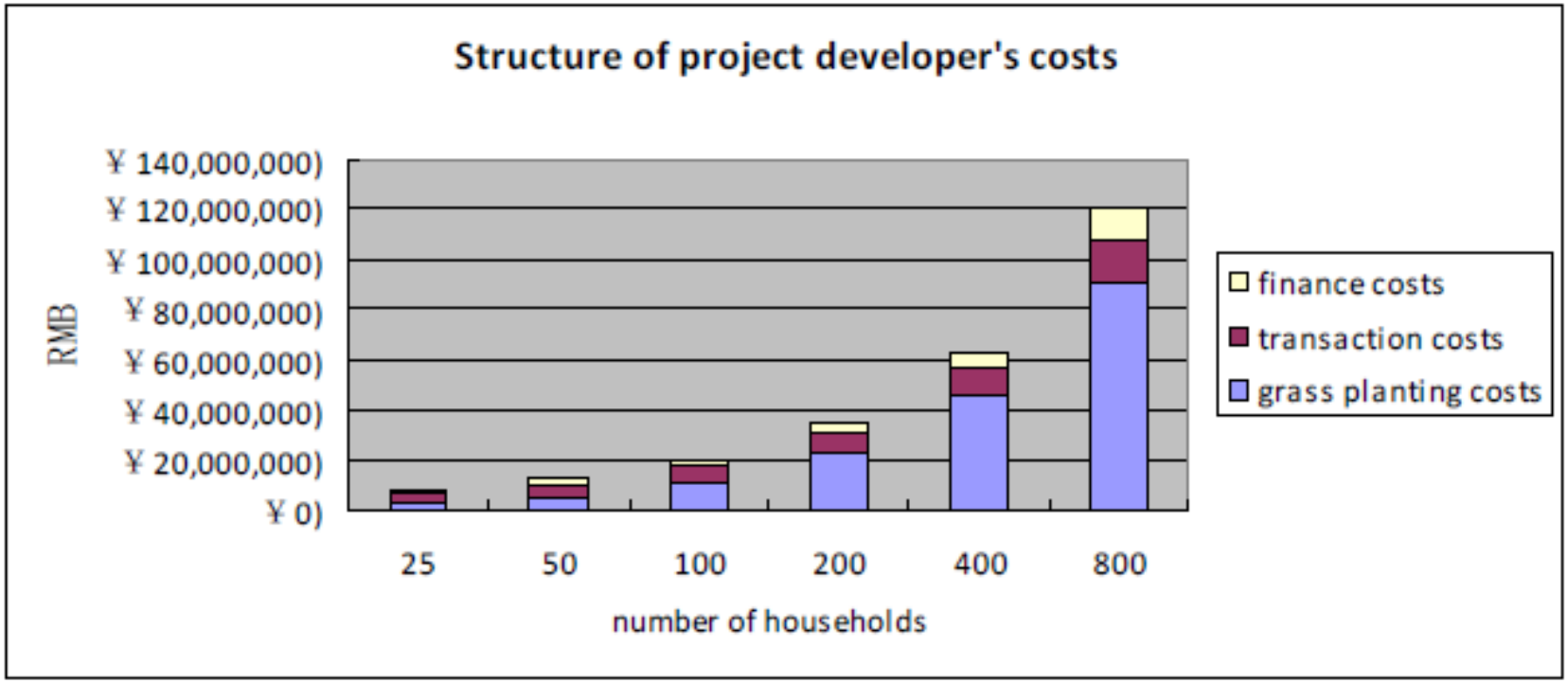
Financial barriers to C sequestration (3)

- Could a project developer/investor finance implementation
- Focusing on option A (30% destock), **can carbon finance cover initial costs of implementation**?
  - Only if carbon credit prices > 6 $\$tCO_2e$
  - Assuming 30% **non-permanence buffer**, the required carbon credit prices > 9 $\$tCO_2e$ would be needed
  - Ave 2010 price of voluntary market credits = $6 (Peters-Stanley et al. 2011)

Barriers - Transaction costs

- **Development:**
  - identify sites; design farm plans; estimate baseline & ERs; design monitoring system; buyer/seller negotiation …etc
- **Implementation (initial setup):**
  - monitoring training; set up contracts with households; office equipment …etc
- **Implementation (annual monitoring):**
  - staff costs; grass planting monitoring; community monitoring meeting; survey …etc
- **Carbon crediting costs:**
  - verification costs, credit issuance costs

Total costs & project scale (1)

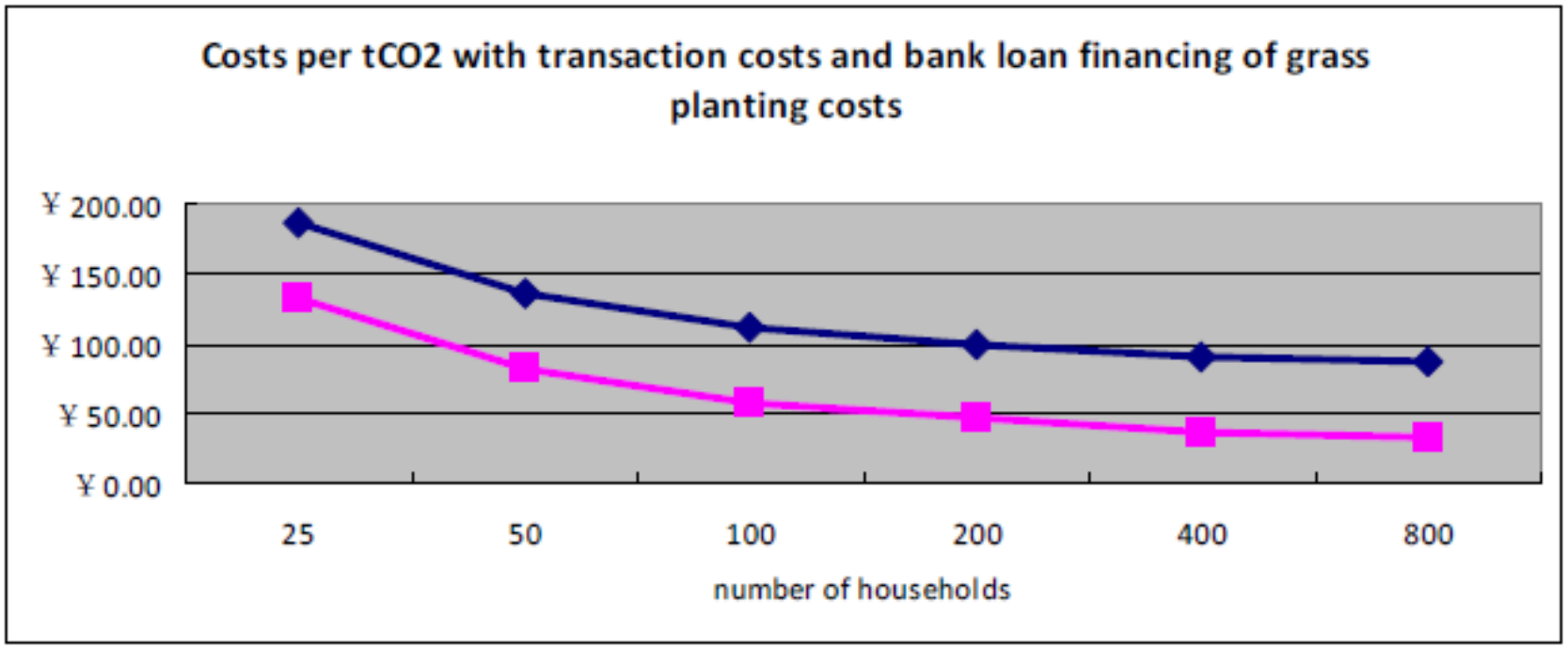


• Compared with grass planting and financing, transaction costs are largely invariant to scale

Total costs & project scale - with cost sharing

- Recalling that households main obstacle to adoption is that livestock destocking sales cannot cover implementation costs

- Project developer finances the difference in household investment & total grass planting costs (pink line)



Costs per tCO_2: 132 & 33 RMB or **21** & **5 USD**

VCS Methodology for Sustainable Grassland Management (i)

- Methodology is currently being validated under the Verified Carbon Standard (VCS) - Targeting **voluntary market**
- Rationale: grasslands have **a large technical potential for C sequestration** (1.5 $GtCO_2e/yr$)
- To date – MRV has been an obstacle
- **Activity based** versus **measurement based** certification
  - Activity based can use calibrate biogeochemical model (e.g. Century)
  - Tradeoff between uncertainty and costs
  - Need for upfront payment
- **Objective:** estimate C sequestration & GHG emission reductions from adoption of sustainable grassland management practices (SGM).
  - focus: carbon sequestration: above ground and soil organic carbon

Methodology for Sustainable Grassland Management (ii)

Applicability conditions

a) Land is **grassland** at the start of the project;
b) Grassland to be sustainably managed is **degraded**;
c) There is no displacement of manure from outside the project boundary to within the project boundary;
d) There is no significant increase of use of fossil fuels, fuel wood from non-renewable sources;
e) There is no significant change in manure management systems within the project boundary;
f) The project activity **does not include land use change**.
g) Where **biogeochemical models** can be demonstrated to be applicable in the project region, they may be used to estimate SOC pool changes. Where such models are not applicable, the methodology provides using direct measurement methods to estimate of SOC pool changes.
h) Regions where precipitation is less or equal to potential evaporation in same period.

Methodology for Sustainable Grassland Management (iii)

	Baseline	**Project**
N2O emissions due to fertilizer use	Tier 1	Tier 1
Emissions due to the use of N-fixing species	Tier 1	Tier 1
Emissions due to burning of biomass	Tier 1	Tier 1
CH4 emissions due to enteric fermentation	Tier 1	Tier 1
N2O emissions from manure and urine deposited on grassland soil during the grazing period	Tier 1	Tier 1
CO2 emissions due to the use of fossil fuels for grassland management	Tier 1	Tier 1
Removals from existing woody perennials	Tier 1	Tier 1
Removals due to changes in SOC	0	Modelling or measurement
Total emissions and removals	**∑ above**	**∑ above**

Timeline

- Methodology approval by Summer 2012
- Qinghai project document development by Autumn 2012
- Negotiations with investor: Autumn 2012
- Project start: 2013

Conclusions / arising questions

- Grassland restoration activities can have a +ve impact on C stocks as well as higher productivity/income achievable.
- Carbon finance can help to meet otherwise prohibitive implementation costs, particularly with appropriate cost-sharing arrangements
- Can payments for C sequestration make a difference in the area of degraded rangeland rehabilitation on large scale? More likely if:
  - Carbon measurement costs can be minimised (e.g. with activity-based methodology)
  - If the co-benefits associated with C sequestration can be remunerated